

**IN THE CLAIMS:**

1. (Currently Amended) A semiconductor device, comprising:  
a bulk substrate and an active layer;  
a multiple thickness buried oxide layer formed ~~above~~ between said bulk substrate and  
said active layer, said multiple thickness buried oxide layer having a substantially  
planar upper surface that contacts said active layer and a non-planar lower surface  
that contacts said bulk substrate; and  
~~an~~ said active layer being formed above said multiple thickness buried oxide layer, said  
semiconductor device being formed in said active layer above said multiple  
thickness buried oxide layer.
2. (Original) The device of claim 1, wherein said bulk substrate is comprised of  
silicon.
3. (Original) The device of claim 1, wherein said semiconductor device is a  
transistor.
4. (Original) The device of claim 1, wherein said semiconductor device is part of at  
least one of a microprocessor, a memory device and a logic device.
5. (Original) The device of claim 1, wherein said active layer is comprised of  
silicon.

6. (Original) The device of claim 1, wherein said active layer has a thickness ranging from approximately 5-30 nm.

7. (Original) The device of claim 1, wherein said buried oxide layer is comprised of silicon dioxide.

8. (Original) The device of claim 1, wherein said multiple thickness buried oxide layer comprises:

a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less than said thickness of said second sections.

9. (Original) The device of claim 1, wherein said semiconductor device is a transistor having a channel region, at least a portion of said channel region being positioned above a section of said buried oxide layer that has a thickness that is less than a thickness of a remaining portion of said buried oxide layer.

10. (Original) The device of claim 1, wherein said semiconductor device is a transistor comprised of a gate electrode and wherein said multiple thickness buried oxide layer has a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less

than a thickness of said second sections, said first section being at least partially positioned under said gate electrode.

11. (Original) The device of claim 1, wherein said semiconductor device is a transistor comprised of a gate electrode and wherein said multiple thickness buried oxide layer has a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less than a thickness of said second sections, said first section being substantially aligned with said gate electrode.

12. (Original) The device of claim 8, wherein said first section has a thickness ranging from approximately 30-50 nm and said second sections have a thickness ranging from approximately 120-180 nm.

13. (Currently Amended) A transistor, comprising:

a bulk substrate and an active layer;

a buried oxide layer formed ~~above~~ between said bulk substrate and said active layer, said buried oxide layer comprising a substantially planar upper surface that contacts said active layer and a non-planar lower surface that contacts said bulk substrate, a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less than said thickness of said second sections; and

~~an~~ said active layer being formed above said buried oxide layer, said transistor being formed in said active layer above said buried oxide layer.

14. (Previously Presented) The transistor of claim 13, wherein said bulk substrate is comprised of silicon.

15. (Previously Presented) The transistor of claim 13, wherein said transistor is part of at least one of a microprocessor, a memory device and a logic device.

16. (Previously Presented) The transistor of claim 13, wherein said active layer is comprised of silicon.

17. (Previously Presented) The transistor of claim 13, wherein said active layer has a thickness ranging from approximately 5-30 nm.

18. (Previously Presented) The transistor of claim 13, wherein said buried oxide layer is comprised of silicon dioxide.

19. (Previously Presented) The transistor of claim 13, wherein said transistor comprises a channel region, at least a portion of said channel region being positioned above at least a portion of said first section of said buried oxide layer.

20. (Previously Presented) The transistor of claim 13, wherein said transistor comprises a gate electrode and wherein said first section of said buried oxide layer is at least partially positioned under said gate electrode.

21. (Previously Presented) The transistor of claim 13, wherein said transistor comprises a gate electrode and wherein said first section of said buried oxide layer is substantially aligned with said gate electrode.

22. (Previously Presented) The transistor of claim 13, wherein said first section has a thickness ranging from approximately 30-50 nm and said second sections have a thickness ranging from approximately 120-180 nm.

23. (Currently Amended) A transistor comprised of a channel region, said transistor comprising:

a bulk silicon substrate and an active layer;

a buried oxide layer formed ~~above~~ between said bulk silicon substrate and said active layer, said buried oxide layer comprising a substantially planar upper surface that contacts said active layer and a non-planar lower surface that contacts said bulk substrate, a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less than said thickness of said second sections; and

~~an~~ said active layer being formed above said buried oxide layer, said transistor being formed in said active layer above said buried oxide layer, at least a portion of said channel region being positioned above said first section of said buried oxide layer.

24. (Previously Presented) The transistor of claim 23, wherein said transistor is part of at least one of a microprocessor, a memory device and a logic device.

25. (Previously Presented) The transistor of claim 23, wherein said active layer is comprised of silicon.

26. (Previously Presented) The transistor of claim 23, wherein said active layer has a thickness ranging from approximately 5-30 nm.

27. (Previously Presented) The transistor of claim 23, wherein said buried oxide layer is comprised of silicon dioxide.

28. (Previously Presented) The transistor of claim 23, wherein said transistor further comprises a gate electrode and wherein said first section of said buried oxide layer is at least partially positioned under said gate electrode.

29. (Previously Presented) The transistor of claim 23, wherein said transistor further comprises a gate electrode and wherein said first section of said buried gate oxide layer is substantially aligned said gate electrode.

30. (Previously Presented) The transistor of claim 23, wherein said first section has a thickness ranging from approximately 30-50 nm and said second sections have a thickness ranging from approximately 120-180 nm.

31.-55. (Canceled)

56. (Currently Amended) A semiconductor device, comprising:

a bulk substrate and an active layer;

a multiple thickness buried oxide layer formed ~~above~~ between said bulk substrate and  
said active layer, said multiple thickness buried oxide layer comprising a  
substantially planar upper surface that contacts said active layer and a non-planar  
lower surface that contacts said bulk substrate;

~~an~~ said active layer being formed above said multiple thickness buried oxide layer, said  
semiconductor device being formed in said active layer above said multiple  
thickness buried oxide layer; and

a doped back gate region positioned at least partially in said bulk substrate under said  
multiple thickness buried oxide layer.

57. (Previously Presented) The device of claim 56, wherein said multiple thickness buried oxide layer comprises:

a first section positioned between two second sections, said first section having a  
thickness and each of said second sections having a thickness, said thickness of  
said first section being less than said thickness of said second sections.

58. (Currently Amended) A transistor, comprising:

a bulk substrate and an active layer;

a buried oxide layer formed ~~above~~ between said bulk substrate and said active layer, said

buried oxide layer comprising a substantially planar upper surface that contacts

said active layer and a non-planar lower surface that contacts said bulk substrate,

a first section positioned between two second sections, said first section having a

thickness and each of said second sections having a thickness, said thickness of

said first section being less than said thickness of said second sections;

~~an~~ said active layer formed above said buried oxide layer, said transistor being formed in

said active layer above said buried oxide layer; and

a doped back gate region positioned at least partially in said bulk substrate under said

buried oxide layer.

59. (Previously Presented) The transistor of claim 58, wherein said transistor comprises a gate electrode and wherein said first section of said buried oxide layer is substantially aligned with said gate electrode.

60. (Currently Amended) A transistor comprised of a channel region, said transistor comprising:

a bulk silicon substrate and an active layer;

a buried oxide layer formed ~~above~~ between said bulk silicon substrate and said active layer, said buried oxide layer comprising a substantially planar upper surface that



contacts said active layer and a non-planar lower surface that contacts said bulk substrate, a first section positioned between two second sections, said first section having a thickness and each of said second sections having a thickness, said thickness of said first section being less than said thickness of said second sections;

~~an~~ said active layer formed above said buried oxide layer, said transistor being formed in said active layer above said buried oxide layer, at least a portion of said channel region being positioned above said first section of said buried oxide layer; and a doped back gate region positioned at least partially in said bulk substrate under said buried oxide layer.

61. (Previously Presented) The transistor of claim 60, wherein said transistor further comprises a gate electrode and wherein said first section of said buried gate oxide layer is substantially aligned said gate electrode.

62. (Previously Presented) The device of claim 1, further comprising a doped back gate region positioned at least partially on said bulk substrate under said multiple thickness buried oxide layer.

63. (Previously Presented) The transistor of claim 13, further comprising a doped back gate region positioned at least partially on said bulk substrate under said buried oxide layer.

64. (Previously Presented) The transistor of claim 23, further comprising a doped back gate region positioned at least partially on said bulk substrate under said buried oxide layer.

65. (Previously Presented) The transistor of claim 49, further comprising a doped back gate region positioned at least partially on said bulk substrate under said multiple thickness buried oxide layer.

66. (Previously Presented) The transistor of claim 52, further comprising a doped back gate region positioned at least partially on said bulk substrate under said buried oxide layer.

67.-73. (Canceled)